PRESENT STATUS OF THE DENDROCTONUS MONTICOLAE INFESTATION OF THE HELENA AND DEERLODGE NATIONAL FORESTS.

--oo))0000((oo--

Forest Insect Field Station,
Coeur d'Alene, Idaho,
Dec. 10th, 1922.

U. S. Department of Agriculture,
Bureau of Entomology.

INDEX

Sub-Titles.	Page
PREFATORY	1
INFESTATION IN LODGEPOLE PINE BY D. MONTICOLAE.	2
Adjacent Land Bounding Blackfoot Working Circle	2
The Blackfoot Working Circle	2
The Helena Working Circle	3
The Nelson Working Circle	4
The Deerlodge Working Circle	5
INFESTATION IN YELLOW PINE BY D. MONTICOLAE	6
Helena National Forest	6
Deerlodge National Forest	6
INFESTATION IN DOUGLAS FIR BY D. PSEUDOTSUGAE	6
Helena National Forest	6
PRESENT CONDITION OF INFESTATION IN LODGEPOLE PINE	7
Helena National Forest	7
Deerlodge National Forest	8
RECOMMENDATIONS	10
Infestation West of Missouri River	10
Infestation East of Missouri River	12

--oo))0000((oo--

PRESENT STATUS OF THE DENDROCTONUS MONTICOLAE INFESTATION ON THE HELENA AND DEERLODGE NATIONAL FORESTS

****

PREFATORY NOTE

In compliance with a request from the District Forester to this station for a forest insect reconnaissance of the Helena and Deerlodge National Forests, the writer was assigned to make the examination, which was conducted during the month of October 1922 with the co-operation of the respective National Forests. In order to ascertain the extent of the infestation it was deemed advisable to view as much of the principal stands of lodgepole and yellow pine as possible. The atmosphere being very clear at the time of the examination an extensive view of all the important areas was obtained from open ridges and mountain tops. Examinations of the 1922 attacked trees were made throughout the infested areas to obtain data on the seasonal history of the mountain pine beetle, and to note the present status of the infestation.

INFESTATION IN LODGEPOLE PINE BY DENDROCTONUS MONTICOLAE

For convenience in discussing the large areas examined, they will be divided into adjacent lands, which includes all land in the vicinity of National Forests and the Forest service working circles. On the Helena, the Blackfoot, Helena,and Nelson, and on the Deerlodge the Deerlodge working circle.

Adjacent Land Bounding The Blackfoot Working Circle.

Within this area is the heaviest infestation in the lodgepole pine. Extending south from the Lincoln basin there is a continuous infestation covering approximately 80 sections and a scattered infestation over portions of 22 sections. On the east, portions of 13 sections partly on the Nevada creek drainage which extends the infestation to the continental divide in the northwest corner of the Helena National forest.

The Blackfoot Working Circle.

The infestation after reaching the Helena National forest in the northwest corner continues along the west slope of the continental divide in the Blackfoot working circle . Where suitable host trees are found the infestation follows the ridges and slopes

of the laterals on the head waters of the Little Blackfoot river drainage and in some of the larger canyons, follows open creek bottoms down for some distance through the larger stands of lodgepole pine. The infestation is of a more or less patchy character from Black mountain south to the headwaters of Dog creek, here it begins to increase and spreads toward the west over considerable territory in the vicinity of the Blackfoot Ranger station. It also follows the crest and slopes of the continental divide south and west to the Helena boundary. In all, the damage is spread over 64 sections in the Blackfoot working circle. The continuation of the infestation beyond the Helena boundary will be considered under the Deerlodge working circle.

The Helena Working Circle.

After reaching the Helena national forest in the northwest corner the infestation also reaches over the continental divide to the east side in the Helena working circle, where it extends north for several sections on adjacent land and then south following down the headwaters of the Little Prickley Pear creek drainage for some distance. From south of T.12 N.,R.7 W. the infestation is scattered over small patches of the larger lodgepole pine along the high ridges and continues along the continental divide to the Deerlodge boundary line.

The Nelson Working Circle.

The infestation in the Nelson working circle is of a much more isolated condition than occuring elsewhere on the Helena national forest. The greatest amount of insect damage was found in the vicinity of Moors mountain where numerous red foliage trees were noted on an open hillside and on close examination recently attacked trees were located. A small infested area in heavy stand of lodgepole pine on the head of Magpie creek* was also examined and 30 recently attacked trees were found. A few infested trees were noted along branch of Trout creek but most of this work was confined to the larger trees along the edge of stands bordering open grass land. Another small infestation was found in sections 2 and 3 T.11 N.,R.1 E. near mouth of Red gulch* and at a later date a few scattered insect killed trees were noted in sections 2 and 12 T.11 N.,R 2 E.

* While these two areas of infestation are a short distance beyond the Nelson working circle boundary, they are included for convenience in handling.

The Deerlodge Working Circle.

In the Deerlodge working circle an examination was made of the area in the vicinity of Emery, Mont. An extensive view of the lodgepole pine stands at the head of Baggs creek and in the large basin south and west of Bison mountain was obtained from the summit of Cliff mountain. As a large percent of the lodgepole pine in this locality is reproduction, the infestation dwindles down to scattered patches among the larger trees and is distributed over nine sections along the slopes at head of Baggs creek and in the vicinity of Emery. In Jan. 1921 the Ranger District office at Deerlodge reported a heavy infestation occuring on the Blum and Gold creek watersheds, and extending over about 25 sections within the north boundary of the Deerlodge national forest. In June 1922 this infestation was reported as increasing and had extended south to Rock creek lake. An examination of the infested area in the vicinity of Rock creek lake was made by the writer in company with District Ranger L.D.Williamson on the 18th. of Oct. 1922. During the examination it was found that the infestation was also present in the Rock creek canyon (Fig.3) and over portions of sections 1 and 2 T. 7 N. R. 11 W. and section 6 T. 7 N. R. 10 W. A number of recently attacked trees were examined and normal broods of nearly half grown larvae were found. In Sep. 1921 a heavy infestation was reported by the District office at Missoula as occuring on the Douglas creek watershed on the Missoula National forest near Hall, Mont. which is only a few miles distant from the northwest boundary of the Deerlodge National forest. It may be possible that the present infestation in the northern portion

of the Deerlodge is a continuation of the heavy infestation on the Missoula in the Blackfoot river watershed and extending south to the Clark Fork river drainage of which Douglas, Blum, Crevice, Gold, Pikes Peak, Willow and Rock creeks are a part.

INFESTATION IN YELLOW PINE BY DENDROCTONUS MONTICOLAE

Helena National Forest

Throughout the scattered yellow pine stands in the Blackfoot, Helena and Nelson working circles but very few insect killed trees were located and of these but three small trees that had been recently attacked. For location of insect killed yellow pine, reference is made to the appended table of locations and map.

Deerlodge National Forest

No insect killed yellow pine was noted on the Deerlodge during the examination.

INFESTATION IN DOUGLAS FIR BY DENDROCTONUS PSEUDOTSUGA

Helena National Forest

While the Douglas fir attains a good growth and is distributed over a large portion of the Helena national forest, but very little damage was found caused by the Douglas fir beetle. In the Nelson working circle a small infested area was located in the upper part

of Trout creek canyon along creek bottom. About 75 trees have been killed during the past two or three years in this area. Three recently attacked trees were found at the time of the examination. On a recent trip over an area south of Antelope creek Mr.A.H.Abbott reports finding about 100 Douglas fir that had been killed by the Douglas fir beetle, but no recent work was found.

PRESENT CONDITION OF THE INFESTATION IN LODGEPOLE PINE

Helena National Forest.

In all infested areas that were accessible, intensive examinations were made to locate newly infested trees by the presence of pitch tubes on the outer bark surface, as on all the 1922 attacked trees the foliage still remained green. Not all trees however, on which pitch tubes are conspicuous indicates a successful attack as in many instances an insufficient number of beetles to overcome the resistance of the the tree resultsin the insects being drowned in the excessive pitch flow. Normal broods of nearly half grown larvae (Fig 6) were found in infested trees throughout the areas. Referring to the appended map and table of localities it will fe found that infested lodgepole pine has been reported on 143 sections on the Helena National forest and 133 sections on adjacent land. Examinations were made by the writer in company with forest service officers over parts of 83 sections through the heaviest portions of the general

infestation extending along the Continental divide from the northwest boundary of the Helena to within a few miles of the south boundary. Over 90% of the area examined, where suitable host trees were available, new attacked trees were found. On some sections an infested tree could be located for each beetle abandoned tree nearby. On other sections the infestation was apparently increasing in some and dying out in others, due to the lack of suitable host material. Taking the 1922 attack as a whole the general infestation appears to be equal to the loss for 1921. A conservative estimate of the total loss of lodgepole pine on the Helena national forest is placed at 22.500.000 B.F., on the adjacent lands near and bordering the Helena, 56.300.000 B.F. These figures are based on the estimate of 250 B.F. per acre for the total stand over the 143 sections on the Helena, 1000 B.F. per acre in stand on 74 sections of the heaviest infestation in the vicinity of Lincoln Mont. and 250 B.F. per acre over 59 sections bordering on the Helena, making a total of 79.300.000 B.F.

Deerlodge National Forest

Referring to the appended map and table of localities it will be found that 63 sections of infested lodgepole pine are reported on the Deerlodge National Forest including the south west portion of the Helena in the vicinity of Emery, Mont. An intensive examination was

made in the heaviest portions of the infestation available over approximately seven sections and the 1922 attack found to be about equal to the 1921 loss. A conservative estimate of the total loss of lodgepole pine on the portion of the Deerlodge as mapped is placed at 10.000.000 B.F. This amount is based on the estimate of 250 B.F. per acre for total stand over 63 sections.

Approved

James Entomologist.

In charge of Field Station.

Respectfully submitted

Henry J. Rust

Entomological Ranger.

RECOMMENDATIONS.

The following recommendations are based upon the data submitted by Mr. Rust, and the information secured from the Forest Officers of the Helena and Deerlodge National Forests.

Infestation West of the Missouri River.

In considering the thoughts of control the infestations which have been described in the body of this report under the Blackfoot, Helena, and Deerlodge Working Circles, and the lands adjacent, and which is shown on the map accompanying this report as being west of the Missouri River, would have to be considered as one control, or infestation unit.(*) Inasmuch as this infestation has reached such a magnitude, and the lodgepole pine is of such a low commercial value, control measures are not recommended for the protection of the remaining stumpage in these areas. This position is taken because it is believed that the tremendous expenditure which would be necessary to control this infestation would be more than the value of the remaining timber would support.

(*) An infestation unit is an area which can not be influenced by conditions in others.

The problem of protecting the more valuable stands of lodgepole south of this area from the ravages of these insects is one that must receive consideration in the near future. The possibility of the Smelter Area acting as a barrier to the spread of these beetles is very small. The western portion of this area still supports a large amount of green timber which would be sufficient to carry this infestation across. This epidemic could also go around this area through the Missoula National Forest, west of Georgetown Lake, and thenacross the Continental Divide.

Though it seem that the control of such a widespread infestation in lodgepole pine is impracticable, there is a possibility that the epidemic may be checked for a period of greater or less extent by natural agencies. If such a check occured, with a possible centralizing of the insects in going around the Smelter Area, or crossing the Continental Divide, it might be practicable to economically inaugurate control measures which would protect the more valuable timber stands of the Big Hole Basin. In view of this possibility and the devastations which have occured in the wake of this epidemic, it is recommended that a thorough examination be made of this region. Such an examination should afford data as to the present status of the infestation, its southern limits, and the regions where there is the greatest chance of it crossing the Continental divide. This examination should be followed each year

by a careful check in order to determine the yearly status and course of the infestation so that advantage can be taken of any favorable opportunity which may exist for control work.

Infestation East of the Missouri River.

Nelson Working Circle.

Throughout this area the past losses from insect attack have been very low. Mr. Rust's report shows that only 125 newly infested trees were recorded during the examination, and if as a matter of safety a 100 percent correction is applied to this figure there would be only 250 trees which were attacked in 1922, within the area. Furthermore it appears that for the past three years the annual loss has shown no increase. This loss is only a very small percent of the total volume, and from the viewpoint of its prevention, control measures are hardly warranted. This condition is no different from the normal infestation which exists in all of our pine forests. However the future of this infestation is difficult to foresee. Should this area be an isolated one there may be no serious losses for many years. On the other hand if it can be reached by the epidemic which has crossed the Continental Divide, south of Lincoln, Montana, it would be well to expect heavy losses within a few years.

If it is realized that it is entirely possible for the present infestation to develop into a serious epidemic, and when the tremendous losses in other areas are considered, it seems that steps should be taken to keep all such endemic conditions from developing into serious proportions. The possibility of this area being far enough removed from other and more serious infestations to permit of it being considered as a separate infestation unit is an issue upon which the application of successful control measures depends. From data submitted by Mr. Rust, and from type maps secured from the Forest Service it appears that this area is sufficiently isolated to be considered as a separate unit. However to inaugurate control measures for an infestation of this status would be an example of intensive forest insect control, for the purpose of preventing rather that suppressing depredations. The economic value of such control is as yet unknown, as an opportunity has never before existed where an experiment could be conducted. The advisability of controlling such infestations depends upon the value of the timber protected as compared with the immediate expenditure necessary. In determining this fact the possible extent of the losses must be visualized, and depredations similar to those on the Blackfoot River must be assumed. It must be borne in mind that that insect control in this area would be only for the purpose of keeping the present infestation in an en-

endemic status, as the treatment of the few infested trees would have little effect upon the depredations caused by an influx of beetles from adjacent areas.

The success of artificial control would be the careful location and treatment of the infested trees before the broods have matured to an adult stage, if it can be assumed that there will be no influence from other infestations. A follow up survey and control should be made in order to treat any broods which escaped the previous operation.

In summarizing it appears that a situation is available where the inauguration of an experimental project, both for the purpose of preventing the wide spread destruction which has occured in other regions and to determine the economic possibility of controlling endemic infestations, is warranted. Unless considered in this light it would not be in accordance with the policy of the Bureau of Entomology to recommend, with our present knowledge, such intensive control measures in such a small area. An experimental project is under way in the Serra National Forest, California, which will make available data as to the possibility of controlling such infestations in yellow pine stands. If possible it would seem advantageous to institute a similar project in the Helena National Forest, the results of which would greatly influence the future recommendations for insect control in lodgepole pine. This experiment would afford valuable information

as to what can be considered an infestation unit, and the practibility of controlling endemic attacks.

As previously stated, if this area is sufficiently isolated, and the work is carefully done, the present conditions should be prevented from developing into an epidemic. However as this is an issue of utmost importance it seems, unless this date is already available to Forest Officers, that a careful examination of this region should be made to determine the degree of isolation from all other lodgepole pine stands and known infestations, before any recommendations are made. Inasmuch as the results of control work in this region would be of great value from an entomological viewpoint as well as forest protection, the Bureau of Entomology will extend any cooperation possible in order to make of this project a success.

Respectfully submitted,

James C. Evenden,
Entomologist. In Charge.

Figure 1.

Dendroctonus monticolae infestation in lodgepole pine stand on the east slope of the Continental divide in the Helena working circle, Helena National Forest. Trees showing light colored foliage have been killed by the Mountain pine beetle.

Oct., 9 th. 1922.
H.J.R.

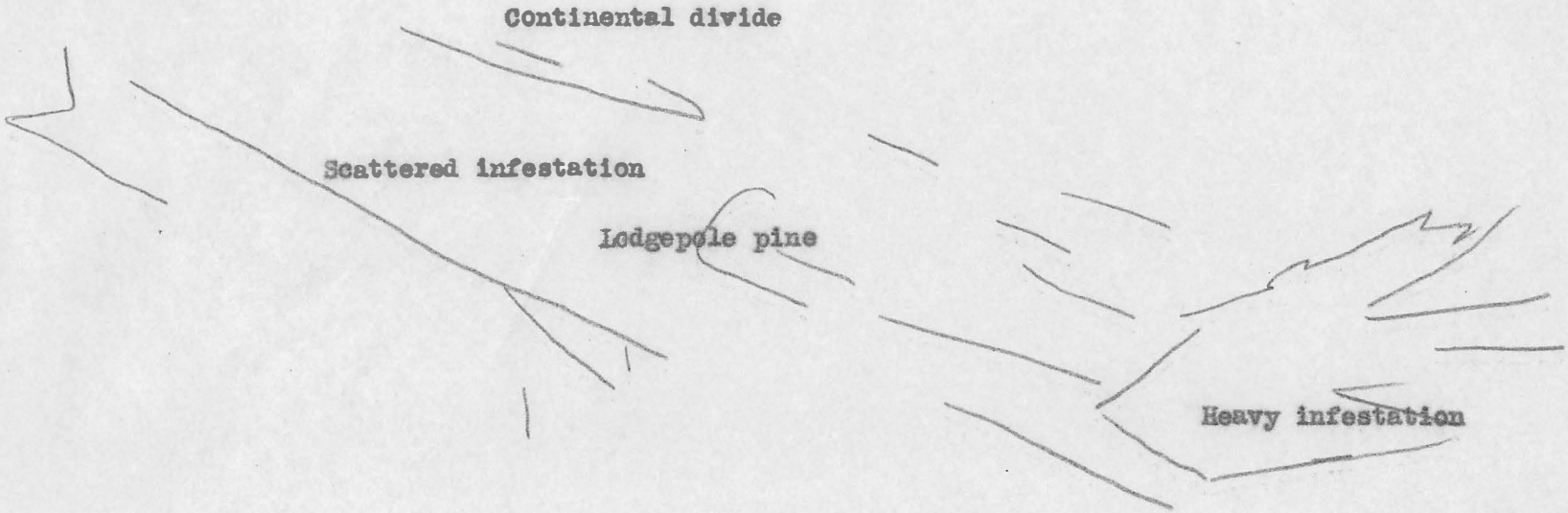

Figure 2

Dendroctonus monticolae infestation in lodgepole pine stand on east slope of the Continental divide in the Helena working circle, Helena National Forest.

Trees showing light colored foliage killed by the Mountain pine beetle.

H.J.R.

Figura 2.

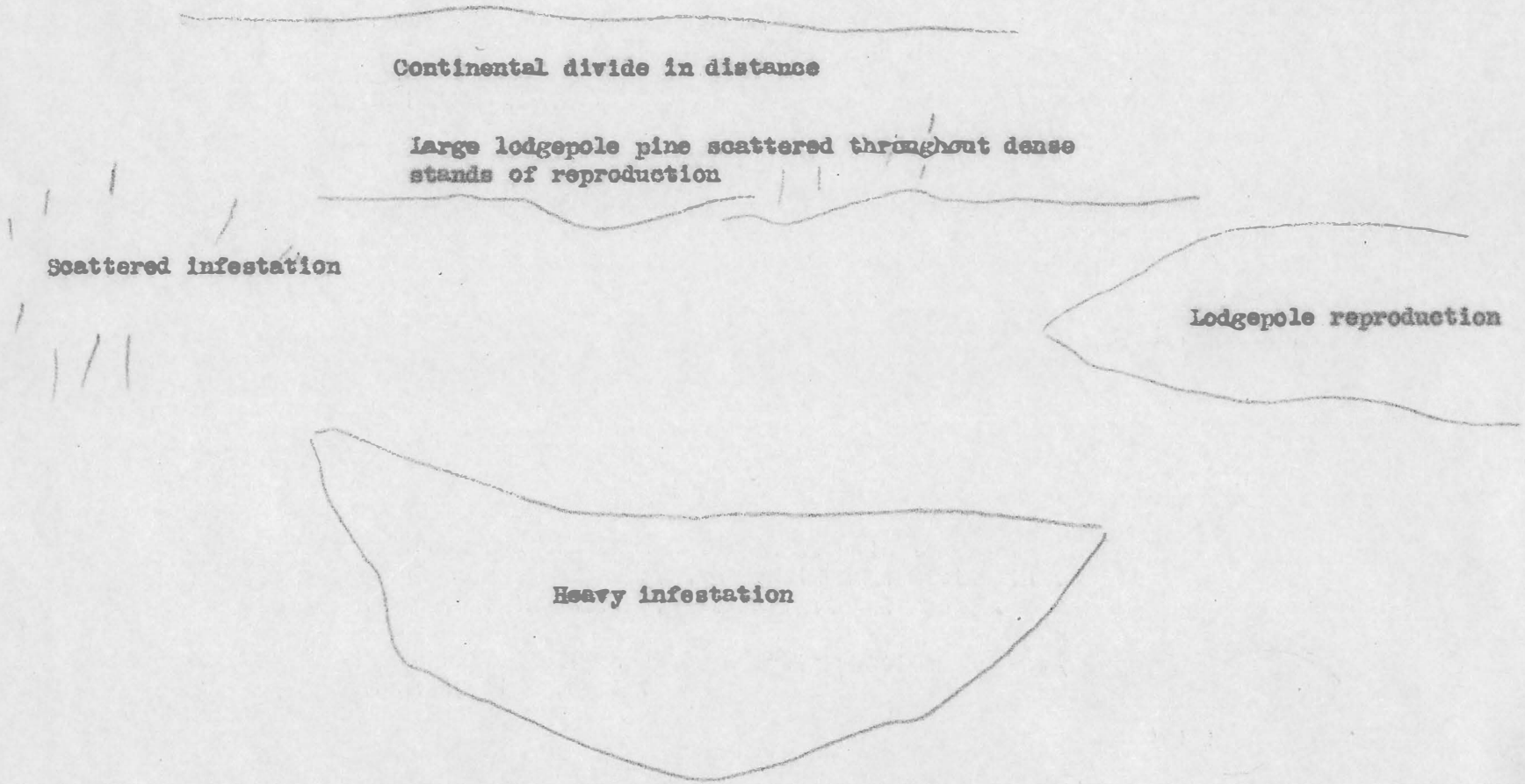

Figure 3

Dendroctonus infestation in lodgepole pine in Rock creek canyon, Deerlodge National Forest. Lodgepole pine showing light colored foliage killed by the Mountain pine beetle.

H.J.R.

Figure 3.

Figure 5.

Lodgepole pine partly girdled by porcupine and later attacked by Dendroctonus monticolae.

Helena National Forest.

Figure 4.

Lodgepole pine 16" D.B.H. killed by Dendroctonus monticolae. Pitch tubes conspicuous.

Deerlodge National Forest.

Figure 6.

Bark removed from lodgepole pine attacked in 1922, showing the long longitudinal egg galleries and short larval mines grooved on the surface of the wood, characteristic of the Mountain pine beetle.

Helena National Forest, October 9 th., 1923.

H.J.R.

Figure 7.

Lunch on Bison Mountain, Helena National Forest, October 12th., 1922.

M.D.Mixner,
District Ranger,
Helena N.Forest.

G.M.Brandborg,
Deputy F.Supervisor,
Helena N. Forest

A.H.Abbott,
Forest Supervisor,
Helena N. Forest.

H.J.Rust,
Entomological Ranger,
Forest Insect,
Field Station,
Coeur d'Alene, Idaho.

H.J.R.

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
HENRY S. GRAVES, FORESTER

DEERLODGE NATIONAL FOREST
MONTANA
MONTANA PRINCIPAL MERIDIAN
1918

NATIONAL FOREST BOUNDARY

Scale 1 0 1 2 3 4 5 Miles

NELSON WORKING CIRCLE

HELENA WORKING CIRCLE

BLACKFOOT WORKING CIRCLE

TOWNSEND WORKING CIRCLE

DEERLODGE NATIONAL FOREST

LEGEND

- D. monticolae infestation in LODGEPOLE PINE.
- D. monticolae infestation in WESTERN YELLOW PINE.
- D. pseudotsugae infestation in DOUGLAS FIR
- IPS. sp. infestation in LODGEPOLE PINE.
- WORKING CIRCLE BOUNDARY
- CONTINENTAL DIVIDE.

LEGEND

- D. monticolae infestation in LODGEPOLE PINE
- EXTERIOR BOUNDARIES OF DAMAGE SMELTER SMOKE AREA 1921 U.S.F.S. 14-13-22.
- LOCATION OF SMELTER

Longitude west from Greenwich

Issued at District Office, Missoula, 1914
Revised May, 1918

TABLE OF LOCALITIES AS SHOWN ON ACCOMPANYING MAPS

Twp.	Range	Sec.	Reported, Date	Examined, Date	Tree sp.	Old Work	New Work	Working Circle
12 N	7 W	18	Mizner, 8/26, 22		L P	x		Blackfoot
12 N	7 W	19	" "		L P	x		"
12 N	7 W	30	" "		L P	x		"
12 N	7 W	31	" "		L P	x		"
11 N	7 W	6	" "		L P	x		"
11 N	7 W	7	" "		L P	x		"
11 N	7 W	8	" "		L P	x		"
11 N	7 W	9	" "		L P	x		"
11 N	7 W	10	" "		L P	x		"
11 N	7 W	11	" "		L P	x		"
11 N	7 W	12	" "		L P	x		"
11 N	7 W	13	" "		L P	x		"
11 N	7 W	14	" "		L P	x		"
11 N	7 W	15	" "		L P	x		"
11 N	7 W	17	A & M, 10/30, 22	A & M, 10/29, 22	L P	x	x	"
11 N	7 W	18	" "	" "	L P	x	x	"
11 N	7 W	20	" "	" "	L P	x	x	"
11 N	6 W	7	Mizner, 8/26, 22	----------	L P	x	----------	"
11 N	6 W	19	" "		L P	x		"
11 N	6 W	23	" "		L P	x		"
11 N	6 W	26	" "		L P	x		"
11 N	6 W	29	" "		L P	x		"
11 N	6 W	32	" "		L P	x		"
10 N	6 W	2	" "		L P	x		"
10 N	6 W	4	" "		L P	x		"
10 N	6 W	5	" "		L P	x		"
10 N	6 W	6	" "		L P	x		"
10 N	6 W	13	A & R, 10/11, 22	A & R, 10/11, 22	L P	x	x	Helena
10 N	6 W	24	"" "	" "	L P	x	x	"
10 N	6 W	35	" "	" "	L P	x	x	Blackfoot
10 N	5 W	19	" "	" "	L P	x		Helena
10 N	7 W	1	Mizner, 8/26, 22	----------	L P	x	------	Blackfoot
10 N	7 W	2	" "		L P	x		"
9 N	5 W	9	Lewis, 10/12, 22		L P	x		Helena
9 N	5 W	16	Abbott, 10/9, 22	Abbott, 10/9, 22	L P		x	" "
9 N	5 W	31	Lewis, 10/12, 22	----------	L P	x		"
9 N	6 W	14	Mizner, 10/13, 22		L P	x		Blackfoot
9 N	6 W	22	" "		L P	x		"
9 N	6 W	23	" "		L P	x		"
9 N	6 W	24	" "		L P	x		"

3

Twp.	Range	Sec.	Reported, Date	Examined, Date	Tree sp.	Old Work	New Work	Working Circle
9 N	6 W	26	Mizner, 8/26, 22		L P	x		Blackfoot
9 N	6 W	27	" "	A & R 12/12, 22	L P	x	x	"
9 N	6 W	28	" "	A & R 10/12, 22	L P	x	x	"
9 N	6 W	29	" "		L P	x		"
9 N	6 W	31	" 7/31, 22	Mizner, 7/31, 22	L P	x	x	"
9 N	6 W	32	" 8/26, 22		L P	x		"
9 N	6 W	33	" "		L P	x		"
9 N	6 W	34	" "	A & R 10/12, 22	L P	x	x	"
9 N	6 W	35	" "	" "	L P	x	x	"
9 N	6 W	36	" "	----------	L P	x		"
9 N	7 W	10	" "		L P	x		"
9 N	7 W	11	" "		L P	x		"
9 N	7 W	12	" "		L P	x		"
9 N	7 W	13	" "		L P	x		"
9 N	7 W	14	" "		L P	x		"
9 N	7 W	15	" "		L P	x		"
9 N	7 W	16	" "		L P	x		"
9 N	7 W	20	" "		L P	x		"
9 N	7 W	21	" "	A & R 10/12, 22	L P	x	x	"
9 N	7 W	22	" "	" "	L P	x	x	"
9 N	7 W	23	" "	" "	L P	x	x	"
9 N	7 W	24	" "	" "	L P	x	x	"
9 N	7 W	25	" "	" "	L P	x	x	"
9 N	7 W	26	" "	" "	L P	x	x	"
9 N	7 W	27	" "	" "	L P	x	x	"
9 N	7 W	28	" "	" "	L P	x	x	"
9 N	7 W	29	" "	" "	L P	x	x	"
9 N	7 W	30	" "	" "	L P	x	x	"
9 N	7 W	31	" "	" "	L P	x	x	"
9 N	7 W	32	" "	" "	L P	x	x	"
9 N	7 W	33	" "	" "	L P	x	x	"
9 N	7 W	34	" "	" "	L P	x	x	"
9 N	7 W	35	" "	" "	L P	x	x	"
9 N	7 W	36	" "	" "	L P	x	x	"
8 N	7 W	1	" 7/31, 22	" "	L P	x	x	"
8 N	7 W	2	" "	" "	L P	x	x	"
8 N	7 W	3	" "	" "	L P	x	x	"
8 N	7 W	4	" "	" "	L P	x	x	"
8 N	7 W	5	" "	" "	L P	x	x	"
8 N	7 W	21	" "	" "	L P	x	x	"
8 N	7 W	23	" "	" "	L P	x	x	"
8 N	7 W	24	" "	" "	L P	x	x	"
8 N	7 W	27	" "	" "	L P	x	x	"
8 N	6 W	2	" "	" "	L P	x	x	"
8 N	6 W	3	" "	" "	L P	x	x	"
8 N	6 W	4	" "	" "	L P	x	x	"

Twp.	Range	Sec.	Reported, Date	Examined, Date	Tree sp.	Old Work	New Work	Working Circle	
8 N	6 W	7	Mizner, 7/31, 22	A & R 10/12, 22	L P	x	x	Blackfoot	
8 N	6 W	11	" "	" "	L P	x	x	"	
8 N	6 W	14	" "	" "	L P	x	x	"	
8 N	6 W	18	" "	" "	L P	x	x	"	
8 N	6 W	19	" "	" "	L P	x	x	"	
8 N	6 W	23	" "	" "	L P	x	x	"	
8 N	6 W	26	" "	" "	L P	x	x	"	
8 N	6 W	27	" "	" "	L P	x	x	"	
8 N	6 W	28	" "	" "	L P	x	x	"	
8 N	6 W	29	" "	" "	L P	x	x	"	
8 N	6 W	30	" "	" "	L P	x	x	"	
8 N	6 W	31	" "	" "	L P	x		"	
8 N	6 W	34	" "		L P	x		"	
7 N	7 W	12	" 10/13, 22		L P	x		"	
7 N	7 W	13	" "		L P	x		"	
7 N	7 W	16	" "		L P	x		"	
7 N	7 W	21	" "		L P	x		"	
7 N	7 W	22	" "		L P	x		"	
7 N	7 W	23	" "		L P	x		"	
7 N	7 W	27	" "		L P	x		"	
7 N	6 W	4	" "		L P	x		"	
7 N	6 W	5	" "		L P	x		"	
7 N	6 W	6	" "		L P	x		"	
12 N	7 W	15	Abbott, 6/1, 22	A & R 10/10, 22	L P	x		Helena	
12 N	7 W	16	" "	" "	L P	x		"	
12 N	7 W	17	" "	" "	L P	x		"	
12 N	7 W	21	" 11/3, 21	" "	L P	x		"	
12 N	7 W	22	" "	" "	L P	x		"	
12 N	7 W	23	" "	" "	L P	x		"	
12 N	7 W	26	" "	" "	L P	x		"	
12 N	7 W	27	" "	" "	L P	x	x	"	
12 N	7 W	28	" "	" "	L P	x	x	"	
12 N	7 W	34	" "	" "	L P	x	x	"	
9 N	5 W	16	" 11/13, 22	Abbott 11/9, 22	L P		x	"	
9 N	4 W	31	Lewis, 11/23, 22	Lewis 11/21, 22		x	x	"	
8 N	4 W	8	" " "	" "		x	x	"	
8 N	5 W	7	" 10/12, 22		L P	x		"	
8 N	5 W	25	" "	A & R 11/14, 22	L P	x		"	
8 N	2 W	3	Abbott, 10/30, 22	Abbott 10/27, 22	L P		x	"	
9 N	2 W	33	" "	" "	Y P	x		"	A L
10 N	5 W	25	Lewis, 10/12, 22	A & R 10/11, 22	Y P	x	x	"	A L
10 N	5 W	35	" "	" "	Y P	x	x	"	A L
8 N	6 W	12	" "		L P	x		"	
12 N	5 W	18	A & R, 10/11, 22	A & R 10/11, 22	Y P	x	x	"	A L

Twp.	Range	Sec.	Reported, Date	Examined, Date	Tree sp.	Old Work	New Work	Working Circle
11 N	2 E	2	Keene	A & J 10/20,22	L P	x	x	Nelson
11 N	2 E	12		" "	L P	x	x	"
12 N	2 E	26	Keene	" "	D F	x		"
12 N	2 E	35	"	" "	D F	x		"
12 N	1 E	2	Abbott, 9/6, 22	A & R 10/4, 22	L P	x	x	"
12 N	1 E	3	" "	" "	L P	x	x	"
12 N	1 E	36	" "	" 10/5, 22	L P	x	x	"
12 N	2 E	18	" "	" "	L P	x	x	"
12 N	2 E	19	" "	" "	L P	x	x	"
12 N	2 E	30	" "	" "	L P	x	x	"
12 N	2 E	31	" "	" "	L P	x	x	"
11 N	1 E	1	" "	" "	L P	x	x	"
11 N	1 E	2	" "	" "	L P	x	x	"
11 N	1 E	3	" "	" "	L P	x	x	"
11 N	1 E	11	" "	" "	L P	x	x	"
11 N	1 E	12	" "	" "	L P	x	x	"
12 N	1 E	22	A & R 10/4, 22	" 10/4, 22	D F	x	x	"
12 N	1 E	23	" "	" "	D F	x	x	"
13 N	1 W	16	Abbott, 9/6, 22	" 10/6, 22	L P	x	x	"
13 N	1 W	17	" "	" "	L P	x	x	"
13 N	1 W	18	" "	" "	L P	x	x	"
13 N	1 W	19	" "	" "	L P	x	x	"
13 N	1 W	20	" "	" "	L P	x	x	"
13 N	2 W	26	A & R 10/6, 22	" "	Y P	x		"

Some of these sections are a short distance beyond the Nelson circle boundary but are included for convenience in handling.

ABBREVIATIONS

Abbott----------A.H.Abbott
Mizner----------M.D.Mizner
Lewis----------D.H.Lewis
Keene----------W.Keene
A & M----------A.H.Abbott and M.D.Mizner
A & R----------A.H.Abbott and H.J.Rust
A & J----------A.H.Abbott and Jones

L P---------Lodgepole pine
Y P---------Yellow pine
D F-------- -Douglas fir
A L---------Adjacent lands

TABLE OF LOCALITIES AS SHOWN ON ACCOMPANYING MAP

Deerlodge National Forest.

Twp.	Range	Sec.	Reported, Date	Examined, Date	Tree sp.	Old Work	New Work	Working Circle
9 N	11 W	17	L.D.W, 1/3,21	L.D.W 1/3,21	L P	x	x	Deerlodge
9 N	11 W	18	"	"	L P	x	x	"
9 N	11 W	19	"	"	L P	x	x	"
9 N	11 W	20	"	"	L P	x	x	"
9 N	11 W	29	"	"	L P	x	x	"
9 N	11 W	30	"	"	L P	x	x	"
9 N	11 W	31	"	"	L P	x	x	"
9 N	11 W	32	"	"	L P	x	x	"
9 N	12 W	13	"	"	L P	x	x	"
9 N	12 W	14	"	"	L P	x	x	"
9 N	12 W	23	"	"	L P	x	x	"
9 N	12 W	24	"	"	L P	x	x	"
9 N	12 W	25	"	"	L P	x	x	"
9 N	12 W	26	"	"	L P	x	x	"
9 N	12 W	34	"	"	L P	x	x	"
9 N	12 W	35	"	"	L P	x	x	"
9 N	12 W	36	"	"	L P	x	x	"
8 N	11 W	1	" 6/22,22	" 6/22,22	L P	x	x	"
8 N	11 W	2	"	"	L P	x	x	"
8 N	11 W	3	"	"	L P	x	x	"
8 N	11 W	4	"	"	L P	x	x	"
8 N	11 W	5	"	"	L P	x	x	"
8 N	11 W	6	"	"	L P	x	x	"
8 N	11 W	7	"	"	L P	x	x	"
8 N	11 W	8	"	"	L P	x	x	"
8 N	11 W	9	"	"	L P	x	x	"
8 N	11 W	10	"	"	L P	x	x	"
8 N	11 W	11	"	"	L P	x	x	"
8 N	11 W	12	"	"	L P	x	x	"
8 N	11 W	13	"	"	L P	x	x	"
8 N	11 W	14	"	"	L P	x	x	"
8 N	11 W	15	"	"	L P	x	x	"
8 N	11 W	16	"	"	L P	x	x	"
8 N	11 W	17	"	"	L P	x	x	"
8 N	11 W	22	"	"	L P	x	x	"
8 N	11 W	23	"	W &"R 10/18,22	L P	x	x	"
8 N	11 W	24	"	"	L P	x	x	"
8 N	11 W	25	W &"R 10/18,22	"	L P	x	x	"
8 N	11 W	26	"	"	L P	x	x	"
8 N	11 W	35	"	"	L P	x	x	"
8 N	11 W	36	"	"	L P	x	x	"

Twp.	Range	Sec.	Reported, Date	Examined, Date	Tree sp.	Old Work	New Work	Working Circle
8 N	10 W	18	W & R 10/18,22	W & R 10/18,22	L P	x		Deerlodge
8 N	10 W	19	" "	" "	L P	x		"
8 N	10 W	30	" "	" "	L P	x		"
8 N	10 W	31	" "	" "	L P	x		"
8 N	12 W	1	L.D.W 1/3,21	L.D.W.	L P	x	x	"
8 N	12 W	2	" "	"	L P	x	x	"
8 N	12 W	3	" "	"	L P	x	x	"
8 N	12 W	10	" "	"	L P	x	x	"
8 N	12 W	11	" "	"	L P	x	x	"
8 N	12 W	12	" "	"	L P	x	x	"
7 N	10 W	6	" "	"	L P	x		"
7 N	11 W	1	" "	"	L P	x		"
7 N	11 W	2	" "	"	L P	x		2
8 N	8 W	36	W & R 10/18,22	W & R 10/18,22	L P	x		"
8 N	7 W	31	" "	" "	L P	x		"
7 N	8 W	1	" "	" "	L P	x		"
7 N	8 W	2	" "	" "	L P	x		"
7 N	8 W	3	" "	" "	L P	x		"
7 N	8 W	10	" "	" "	L P	x		"
7 N	8 W	11	" "	" "	L P	x		"
7 N	8 W	12	" "	" "	L P	x		"
7 N	7 W	7	" "	" "	L P	x	x	"

ABBREVIATIONS

L.D.W.----------L.D.Williamson
W & R ----------L.D.Williamson and H.J.Rust
L P ----------Lodgepole pine